

Mississippi Wing Civil Air Patrol

Aerial Videography

SSTV Procedures
With The
Kenwood VC-H1



**Prepared
by
MS WG HQ**

**Project Officers:
Maj T. C. Carroll, CAP
Col Donald B. Angel, CAP**



HEADQUARTERS
MISSISSIPPI WING CIVIL AIR PATROL
UNITED STATES AIR FORCE AUXILIARY
1635 AIRPORT DRIVE
JACKSON, MS 39209

MEMORANDUM TO VC-H1 TRAINEES

DATE: 7 August, 1999

The following materials have been prepared for presentation at MS WG CAP's first training session for flight crews who will be using the Kenwood VC-H1 hand held SSTV units.

In addition to the actual VC-H1 kit and components, the classroom instruction materials include:

1. VC-H1 Video Scan Kit "CN" Case & Components List
2. VC-H1 Instruction Manual, Pages 2, 3, 5 & 6
3. Louisiana Wing CAP "Aerial Photography - Recorded Video Manual"
4. Recommended Video Profile per LA WG CAP

We want to thank and acknowledge Louisiana Wing for its kind permission for allowing us to reprint their booklet entitled, "Aerial Photography - Recorded Video." The booklet, attached, was originally prepared by the Ascension Parish Composite Squadron. The procedures set forth in this material are directly applicable to our purposes using the Kenwood VC-H1 equipment.

Today's session contains two elements. A two-hour ground school/orientation and a two-hour flying session. For our purposes, the VC-H1's will be primarily used for Disaster Relief. IE: Earthquake, Hurricane, Floods, Tornadoes and like. As we obtain funding to purchase more units, we will expand into Search and Rescue.

A handwritten signature in black ink, appearing to read "D. Angel".

Donald B. Angel
Colonel, CAP
Commander

A handwritten signature in black ink, appearing to read "T. C. Carroll".

T. C. Carroll
Major, CAP
Inspector General

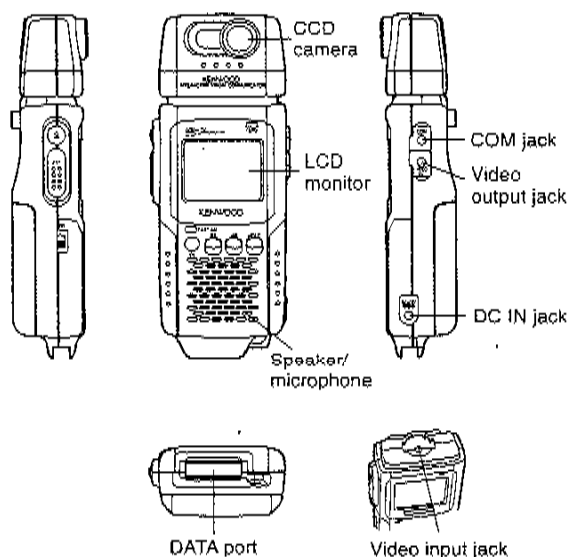
VC-H1 Video Scan Kit

"CN" Case & Components

- I. Rear Compartment:**
 - A] Shoulder Strap
- II. Main Compartment:**
 - A] KSC-8A Compact Charger [For TH-22AT]
 - B] TH-22AT Kenwood 144MHz FM Transceiver
 - 1] Antennae for TH-22AT
 - 2] PB-34 9.6V 600mAh NiCd Battery Pack [Attached to TH-22AT]
 - 3] Carry Strap [Attached to TH-22AT]
 - C] VC-H1 Interactive Visual Communicator
 - (Store Face Down in Cardboard Tray)*
 - 1] TH-22AT / VC-H1 Connector Cable
 - 2] Four "AA" LR6 Alkaline Batteries [Attached to VC-H1]
 - 3] Carry Strap [Attached to VC-H1]
 - D] Lens Cloth
 - E] Pull Guard Strap
- III. Front Compartment:**
 - A] Instruction Manuals:
 - 1] TH-22AT Kenwood 144MHz FM Transceiver
 - 2] VC-H1 Interactive Visual Communicator
 - 3] KSC-8A Compact Charger
 - 4] PB-34 9.6V 600mAh NiCd Battery Pack
 - B] KCT-24S PC Connection Kit
 - 1] E30-3363-XX Connection Cable
 - 2] T93-0116-XX Control Program [Disk 1]
 - 3] T93-0115-XX Base Station Program [Disk 2]
 - 4] KCT-24S Instructions & License Agreement
- IV. Right End Compartment:**
 - A] 6-Ft (1.82m) Y-Adapter Audio Cable
 - (Use Red Terminal Only)*
 - B] Dual Suction-Cup BNC Antenna Mount; 6-ft, 50 ohm RG58/U cable
 - 1] Installation Instructions for Dual Suction-Cup Antenna Mount
- V. Left End Compartment:**
 - A] Kenwood 6V DC 550mA Power Adapter
 - (Power Only; Not a Charger)*
 - B] One set of four "AA" LR6 Alkaline Batteries

GETTING ACQUAINTED

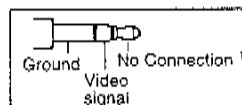
ORIENTATION



CONNECTOR DESCRIPTIONS

① Video input jack

This jack accepts a 3.5 mm (1/8") diameter, 3-conductor plug. You may connect a digital camera or 8 mm VTR to take in images (acceptable video signals: 75 Ω , 1 V_{p-p} (140 IRE) \pm 15%, NTSC).



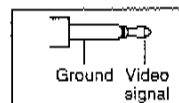
¹ When connecting a device other than the provided camera unit, using this conductor could cause the device to be damaged.

② COM jack

Connect a personal computer in which a dedicated program has been installed. For details, contact your authorized **KENWOOD** dealer, customer service, or service center.

③ Video output jack

Connect an external monitor, if you prefer. This jack accepts a 2.5 mm (1/10") diameter, 2-conductor plug.



④ DC IN jack

Connect the provided AC adapter to use power supplied from an AC outlet.

⑤ DATA port

Connect your transceiver. See page 5.

2

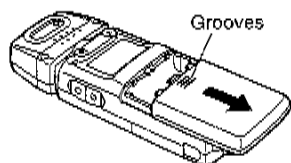
PREPARATION

INSTALLING ALKALINE BATTERIES

WARNING!

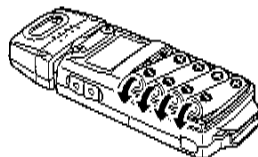
- DO NOT INSTALL THE BATTERIES IN A HAZARDOUS ENVIRONMENT WHERE SPARKS COULD CAUSE AN EXPLOSION.
- NEVER DISCARD OLD BATTERIES IN FIRE BECAUSE EXTREMELY HIGH TEMPERATURES CAN CAUSE BATTERIES TO EXPLODE.

- 1 To remove the battery cover, slide the cover outward while slightly pushing on the grooves on the cover.

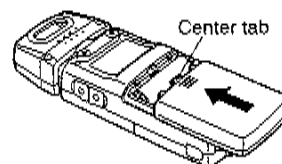


- 2 Insert four AA (LR6) alkaline batteries.

- Be sure to match the battery polarities with those marked on the VC-H1.



- 3 Align the three tabs on the battery cover, then slide the cover inward until the center tab clicks.



Note:

- It is strongly recommended to use high quality alkaline batteries rather than manganese batteries, to enjoy longer periods of battery life. Do not use commercially available NiCd batteries.
- If you will not use the VC-H1 for a long period, remove the batteries from the VC-H1.
- Do not use different kinds of batteries together.
- When the battery voltage is low, replace all four old batteries with new ones.

The approximate lives of alkaline batteries depending on the operation status are shown below:

Camera ON	50 minutes
Monitor ON (memory recalled)	2 hours
Monitor OFF	6 hours

When the batteries become almost empty while the TX/RX indicator is green, the indicator starts blinking. Replace the batteries at that time. This function, however, does not operate while Fast FM mode is currently selected.

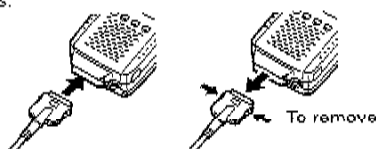
3

CONNECTION WITH A HANDY TRANSCEIVER

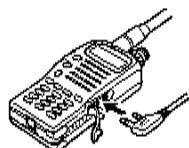
Use the provided cable to connect the VC-H1 with a handy transceiver.

Note: A cable for connecting with a TM-255, TM-733, TM-V7, or TM-G707 transceiver is available as an option. Contact your authorized KENWOOD dealer, customer service, or service center. To connect with a transceiver other than these, the provided cable needs to be modified. The connection diagram with a TS-570 or TS-870 transceiver is shown in page 16.

- 1 Confirm that the power switches of both the VC-H1 and transceiver are OFF.
- 2 Connect the appropriate end of the provided cable to the DATA port of the VC-H1.
 - To remove the cable from the VC-H1, pull the cable connector downward while pushing its tabs from both sides.



- 3 Connect the other end of the cable to the speaker/microphone jacks on your handy transceiver.

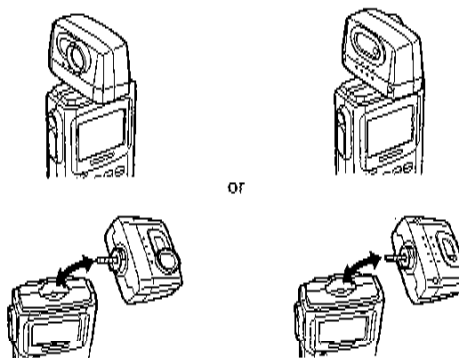


Note: The VC-H1 functions as a speaker microphone only when connected with a handy transceiver. You need not switch ON the VC-H1.

REMOVING/ REINSTALLING THE CAMERA UNIT

Note: Turn OFF the power to the VC-H1 before removing or reinstalling the camera unit.

To remove the camera unit, first turn it so that it crosses at right angles with the main unit.



To reinstall the camera unit, first position the port on the camera unit over the port on the main unit so that the two units cross at right angles.

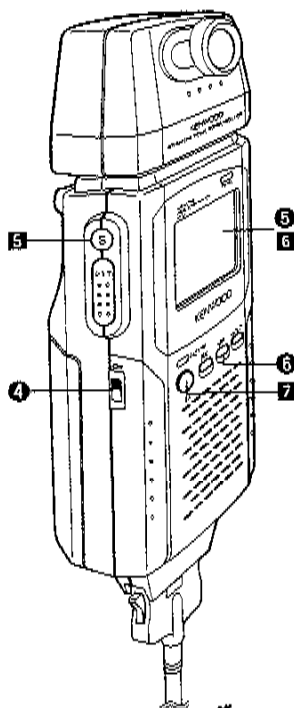
Note: The camera unit has a structure that allows the plug assembly to be slightly moved. This is aimed at absorbing stress to be caused when the camera unit is turned.

5

QUICK USE

If you have a handy transceiver, the steps given here will allow you to try SSTV with your friend right away.

Note: To correctly receive or transmit images, you and your friend have to select the same SSTV mode. If you prefer using a mode other than Robot (color) 36 which is the factory default, see "SELECTING A SSTV MODE" (page 7) and "RECEIVING IMAGES" (page 10).



- 1 Confirm that the VC-H1 has been correctly connected with the transceiver (page 5).

On the transceiver:

- 2 Turn ON the power to the transceiver. *
- 3 Select the same frequency as the other party.

On the VC-H1:

- 4 Slide the PWR switch upward to turn the power ON.
 - The TX/RX indicator lights green.

To receive and store an image in memory:

- 5 When an image signal is received, the image is displayed on the monitor.
 - The TX/RX indicator lights orange while an image is being received.
 - If the TX/RX indicator is green even when the monitor is deactivated by the Battery Saver (page 11), the VC-H1 can receive an image.
- 6 To store the received image in memory, press [MR].

To transmit an image:

- 5 Press [S] to activate both the camera and LCD monitor.
 - The TX/RX indicator goes out.
- 6 While looking at the LCD monitor, turn and focus the camera onto an object.
- 7 Press [TX] to capture and transmit the image.
 - You need not press the PTT switch.
 - The TX/RX indicator lights red during transmission.
 - A horizontal line appears and slowly moves downward to show the progress of transmission.

6a. Press [S] AGAIN TO CAPTURE IMAGE.

6

* ADJUST VOLUME 1/2 to 1/2 ON TRANSCEIVERS

From KENWOOD VC-H1 MANUAL

AERIAL PHOTOGRAPHY RECORDED VIDEO

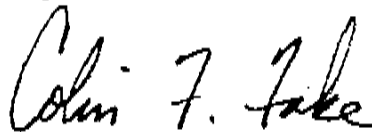
INTRODUCTION

The Arkansas Wing has initiated an aerial photography procedure that has proved to be an excellent communications tool. Their written procedure is an accepted standard for still (candid) aerial photography. This booklet presents a second procedure for aerial photography that addresses recorded video, with a third procedure expected to follow that will address live video.

During a February, 1995, special Regional SAREX, the six states of the Southwest Region participated in an exercise to develop recorded video techniques that would allow simple training requirements for standardized results. Much of the Arkansas manual was utilized for standardization. Multiple ground targets were briefed to the flight crews, and results were assessed following each training flight. At the conclusion of the SAREX, flight crew comments were incorporated to develop a simple, yet effective plan for successful aerial video. Subsequent testing of these procedures in a local squadron SAREX with minimal briefing/debriefing time for inexperienced flight crews produced highly effective video results for ground debriefings.

As the Arkansas manual states, standardization is the key to success for both still photography and video. Many of the still photo procedures will apply to recorded video as well. In fact, most missions would be well served if both still and recorded video were used. A good still shot of the target area "footprint" would provide reliable map orientation of the general target area, while a close-up would provide details of the target not available in video, especially by photo enlargement.

I encourage your support of these recorded video procedures and request your comments. Good "hunting" and SAFE FLYING!



COLIN F. FAKE, Colonel, CAP
Commander, LA Wing

EQUIPMENT

1. **Video Camera**—Due to the high cost of video cameras and the wide variety available, the procedure will not be type-specific. The 8mm recorder gives the best quality of playback, but VHS cameras also are adequate. An 8x zoom lens will give good coverage, but 10x or 12x zoom is better. The camera, however, should be capable of playback on standard television monitors.
 2. **Filters**—Lens filters should be installed to reduce blurring and distortion from glass and serve to protect the camera lens from dust and scratches.
 3. **Tapes**—Tapes should be adequate for the expected duration of the filming mission and a spare tape should be readily available in flight.
 4. **Batteries**—Camera batteries are critical. Most cameras are equipped with "1 hour" batteries (which will record 30 to 40 minutes with standby time) and "2 hour" batteries (which may last up to 1 hour and 20 minutes). Battery care is essential to maintaining usage time. Total discharge and recharge is necessary occasionally on most batteries to avoid "memory" reduction.
 5. **Ops Check**—A good operational check of the camera before departure is essential to avoid a non-effective mission. Check the camera by recording for a few moments, playback in camera to check focus and overall operation, then rewind to the start position before departing.
 6. **Intercom Connection**—Camera connection to the aircraft intercom is essential to allow intercom inputs into the camera audio. Target description and inflight narration improves the quality of debriefing. An inexpensive audio-splicing jack can be obtained at most audio or camera stores.
 7. **Optional Equipment**—Optional equipment such as a headset and extra seat cushion could prove very beneficial for the photographer. Additional crew members should be equipped with a clipboard, detailed aerial charts and road maps, and pen/pencil for keeping a photo log for still photos.
8. **VC-H1 Video Scan Kit** [list of contents attached] (added by MS WG)

BRIEFING

1. Mission Objective(s)–

- a) Target area description (flooding, hurricane damage, forest fire damage, disasters).
- b) Objects to be observed (survivors, buildings, bridges, roads).

2. Target Location–

- a) Sectional and grid number.
- b) Latitude/Longitude.
- c) Significant local landmarks.

3. Routing–

- a) To target area.
- b) Within filming area.
- c) Return to base.

4. Minimum Altitudes–

- a) Enroute.
- b) Within filming area.
- c) Upon recovery.

5. Aircraft Maneuvering Speeds–

- a) Normal cruise.
- b) During turns.
- c) Minimums inflight ($1.3 \times V_{so}$).

6. Flight Precautions–

- a) Obstructions to flight (towers, power lines, terrain).
- b) Flight restrictions (noise abatement, populated/restricted areas).
- c) High density air traffic areas (VR/IR routes, MOAs, airports).

7. Communications–

- a) CAP primary and secondary frequencies.
- b) Air traffic control frequencies.
- c) Supplemental frequencies of other agencies.
- d) Requested "ops normal" call-in timing and other contacts.

8. Navigational Aids Check–

- a) Current VFR sectional.
- b) Current IFR charts and approach plate (if IFR anticipated enroute).
- c) Gridded sectional.
- d) road map.
- e) Additional topographic maps (as desired).

PILOT TECHNIQUES

1. **Crew Coordination**—A full understanding of the inflight roles and responsibilities is essential to a safe and effective mission. Coordination with the camera operator is a must in flight.
2. **Enroute**—Travel to the target area will provide time for the camera operator to check intercom audio into the camera system (usually by the pilot or observer) and to develop first pass heading for orientation.
3. **Heads Up Call**—The pilot is to announce estimated time to target such as "5 minutes to orientation pass" to give the camera operator a heads-up to prepare for photography. Additional heads-up call for anticipated time for preparation to film ("20 seconds to filming") aids in timing sequence.
4. **Target ID Pass**—The first pass over the target is to be at an altitude low enough to positively identify the target and to set up for an easy climbing turn to 2000' AGL in the direction toward the first camera pass.
5. **First Filming Pass**—The first camera pass is to be taped with the camera operator facing north to allow easy map orientation. This run is to be started 2 to 3 miles to the west of the target (camera operator behind and on the same side of aircraft as pilot) and approximately 2 miles south of the target at 2000' AGL.
6. **Second Filming Pass**—After the camera operator announces the pass is complete, the pilot is to maneuver for the second pass while descending to 1000' AGL. The second pass is again made flying west to east (with the camera operator looking north) at 1 mile out from the target.
7. **Target Circle**—When the camera operator announces completion of filming the second pass, the pilot is to maneuver to encircle the target at 500' AGL. Again starting the filming looking north, the pilot is to maintain a coordinated turn at approximately one-half mile around the target. This is flown at normal cruise airspeed and no less than 1.3 x V_{so}. Filming is continued until a full circle of the target is completed and the camera operator again is looking to the north.
8. **Repeats**—The pilot should be prepared to accomplish any repeat passes as directed by the camera operator, and should fly as smooth as possible at all times to minimize these repeat passes.
9. **Visual Lookout**—The pilot and observer must be constantly aware of the need to maintain good "see and avoid" clearing techniques and not become engrossed in the photography work at the expense of safety.

CAMERA OPERATOR TECHNIQUES

1. **Coordination**—The camera operator(s) must have full agreement and cooperation with the pilot as to flight techniques, sequence of events, and timing.
2. **Enroute**—Enroute to the target the camera operator is to prepare and test equipment. All needed supplies, connections, etc. are placed ready at hand. Agreement within the crew must clarify who will provide audio commentary (normally the pilot or observer) and how the camera operator will direct "record on" and "record off" calls to the crew.

CAUTION: All radio volume should be lowered to acceptable minimums and all crew member conversations should cease (except for emergencies) during recording sessions.

3. **Target ID Pass**—The first orientation pass is used to positively identify the target and to assess physical position in the plane for comfort and stability of camera.
4. **First Filming Pass**—The first camera pass is made looking north at 2000' AGL and 2 miles out from target. An orientation "footprint" of the target area is to be made starting the shot at wide angle, with the target lower center of the viewfinder, full horizon, and sky included with date stamp on film (if able). This first recording should be about 20 to 30 seconds. After 5 to 8 seconds of the "footprint" the camera is to be zoomed in with the date removed. The pilot or observer provides verbal commentary of target location, description, coordinates, and flight position (2000' AGL / 2 miles south/looking north). Before completing the pass, the camera is zoomed back to wide angle for a repeat of the "footprint."
5. **Second Filming Pass**—The second camera pass is made at 1000' AGL and 1 mile out from the target flying west to east. The same camera procedure is used as above. Again, the date is inserted at the beginning of the "footprint." The same zoom in and out technique is appropriate and the audio input again identifies the new position (1000' AGL / 1 mile out).
6. **Target Circle**—The third pass is made at 500' AGL and one-half mile out, encircling the target for 360 degrees. The shot should be started looking north and wide angle. The date should be inserted at the start and removed after a few seconds. The shot is to be zoomed in close and held for the full circle and smoothly zoomed out to wide angle at the end of the sequence, again looking north.

CAUTION: Plane movement makes continuous "smooth" camera operation difficult. The camera operator position in the plane is critical to acceptable video results. The camera operator must be comfortable in a position to hold the camera for long periods and to absorb as much of the aircraft movement as possible. Long distance (zoomed in) shots are especially vulnerable due to the magnification and apparent motion. Good camera technique also dictates slow and infrequent in/out zooms to avoid distraction to the viewer.

NOTE: Still photography can be accomplished by a second camera operator, if room permits, while making the video passes. There is ample time during the passes with the still camera operator positioned alongside or shooting over the video camera operator. Another option would be to have the observer in the right front seat use the camera. This could be done by directing the pilot to fly 180 degrees opposite the previous pass at the same altitude before descending. The video camera operator can also accomplish still shots but would have to switch sides within the aircraft while making the 180 degree return or by another pass at the same altitude and distance.

Some recorded video assignments may not lend themselves to single target techniques. Such assignments may be wide area flooding, highway routing, hurricane damage, and other large-area natural disasters. Pilotage and video techniques would differ only in number and position of passes and start/stop points. The same general principles apply and pilot / camera operator procedures / precautions / responsibilities / coordination are imperative.

RECOVERY AND DEBRIEFING

Immediately upon completion of the photographic mission, contact mission base for additional instructions or taskings. If directed to return to base, do so expeditiously (yet safely) and immediately forward the video film and/or still camera film to the assigned dispatcher for debriefing.

The Pilot-in-Command is responsible for a thorough mission debriefing with the entire crew and mission debriefer(s). Additional narration and thorough documentation of filming results is essential to the mission success. Upon completion of the debrief, the flight crew should prepare their aircraft and photographic equipment for the next potential mission and await further direction from mission staff.

Suggestions or critiques of the enclosed procedures should be addressed to the Louisiana Wing Video Project Officer: 1Lt Harry Stafford
Ascension Parish Composite Squadron
P.O. Box 911
Gonzales, LA 70737
Telephone: (504) 844-1959 Patch Design: 2Lt Chuck Babin

RECOMMENDED VIDEO PROFILE

